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RESEARCH ARTICLE



Groundwater governance through institutional bricolage? Participation in Morocco's Chtouka aquifer contract

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ABSTRACT

Controlling groundwater use has become one of the most urgent and difficult issues in common-pool resource governance. This article analyses an aquifer contract in Morocco as an innovative, participatory approach to the problem. Cleaver's concept of institutional bricolage allows us to understand how its implementation affected and interacted with existing social institutional arrangements for water use. The findings confirm that an awareness of insufficient rules is a precondition for new governance arrangements. They reveal how power relations and social institutions influenced the implementation of the aquifer contract. Finally, they show how social and cultural affiliations shape the implementation.

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Introduction

Since the introduction of motor pumps in the 1950s and their widespread use since the 1980s, groundwater-dependent economies have emerged all over the world. In the Maghreb countries and Southeast Asia, agricultural intensification has accelerated, and groundwater resources have been heavily depleted (Shah, 2014). In most cases, irrigated agriculture is the main user of groundwater resources; nearly a quarter of freshwater consumed by global agriculture derives from aquifers (43% globally, 40% in Morocco) (Siebert et al., 2010).

Groundwater-irrigated areas pose distinct management challenges. The numerous and diffuse abstraction points lead to high public transaction costs for the monitoring, control and application of sanctions (Del Vecchio & Barone, 2018). Authors have, therefore, claimed that groundwater is 'one of the most mismanaged resources globally' (Reddy et al., 2014, p. 276) as these characteristics make it practically impossible to control water exploitation through regulatory instruments. Given the urgent need to regulate groundwater use, and the inefficiency of existing top-down approaches, scholars have advocated self-governance systems through participatory decision-making (Lopez-Gunn & Martinez Cortina, 2006; De Stefano & Lopez-Gunn, 2012). As they argue, the evolution of institutions resulting from participatory interventions is expected to

strengthen users' compliance with the rules and encourage local self-governance, while reducing public transaction costs for resource monitoring (Lopez-Gunn & Martinez Cortina, 2006; De Stefano & Lopez-Gunn, 2012).

Research on the design and evolution of institutions for common-pool resource management has been marked by the institutionalist school of thought around Elinor Ostrom (Ostrom, 2005). Ostrom's 'operational rules in use' directly affect day-to-day decisions, including those of groundwater users (Ostrom et al., 2014). However, critical institutionalists raise concerns about the underlying assumptions of the institutionalists' theories that rely heavily on rational-choice theories and, according to the critical institutionalists, neglect the impact of (unconscious) social and cultural factors on actors' behaviour. Critical institutionalists argue that beyond participation in formal policies and rules, natural-resource governance needs to assess institutional transformation via processes of social interaction and power relationships (Cleaver, 2012; Hall et al., 2014).

The present paper adopts a critical institutionalist perspective to scrutinize the potential of the participatory approach for a better understanding – and ultimately implementation – of it in groundwater management. More specifically, we analyse how social institutions at the local level (such as irrigation associations or informal water user groups sharing joint pumping stations, but also family networks or village communities) affect the implementation of an aquifer contract via institutional bricolage, a concept developed by Frances Cleaver (Cleaver, 2002, 2012). With some exceptions (such as De Bont et al., 2016), this concept has mostly been applied to study surface water or other natural resources (Cleaver, 2002, 2005).

The aquifer under study is located in southern Morocco's water-scarce Souss-Massa Valley, where policymakers and local stakeholders adopted a contract to impede further depletion of groundwater resources. Evaluations of the effectiveness of this Souss-Massa aquifer contract, which expired in 2017 after 10 years of implementation, differ. While representatives of water-related administrations highlight the success of increasing farmers' willingness to participate in formal groundwater institutions and comply with the official water law (authors' interviews; Faysse et al., 2012), other observers state that the implementation has 'been undermined by a general *laissez-faire* attitude' (Closas & Molle, 2016, p. 23). Against these contradictory assessments, we analyse the role of social aspects of the aquifer contract to understand the dynamics of implementation and the varying perceptions on its functioning. Adopting the concept of institutional bricolage to study these dynamics, the analysis reveals the impactful interference of power, social and cultural factors, and informal rules in the functioning of formal rule implementation.

This study is based on a thorough literature review and extensive field research that included 45 qualitative interviews conducted in Morocco in 2017. The paper is structured as follows. The next section introduces the concept of institutional bricolage as the theoretical approach for analysis of the aquifer contract's functioning and summarizes the methodological approach. The third section introduces the case study region and presents the findings. The discussion and conclusions section reviews these results in light of existing research, further research needs and policy implications.

Theoretical and methodological approach

Critical institutionalism and the institutional bricolage approach to analysing an aquifer contract

The analysis of groundwater governance often primarily relies on formal regimes and their problems of implementation but does not often fully consider social rules and their functioning. However, these factors frequently heavily influence the success or failure of groundwater governance. This lack of consideration for social aspects may be due to the assumption that the invisibility of the resource impedes the existence of social institutions for its regulation (Shah, 2009). The concept of institutional bricolage (Cleaver, 2002, 2012) bridges this gap because it allows for a comprehensive analysis of informal institutions and their interplay with formal ones. The following explanation will show the importance of this difference to the understanding of institutions for groundwater governance and related institutional change, such as an aquifer contract.

The critical institutionalist approach to bricolage emerged as a response to mainstream institutionalism. Both streams of thought, mainstream institutionalism and critical institutionalism, see the evolution of institutions at the centre of social systems that successfully self-govern open-pool resources. Institutions are defined as norms, rules for use and arrangements that structure the access, use and distribution of natural resources among their users (Crawford & Ostrom, 1995). Mainstream institutionalism is based on the assumption that actors behave according to rational and purposeful choices (Forsyth & Johnson, 2014). As such, institutional rules are understood as consciously crafted conventions that evolve from human interactions and past problem-solving strategies that become renegotiated and adapted to changing, for example, environmental conditions. Ostrom assumed that humans can discursively refer to applied working rules in social interactions (Ostrom, 2005). Although Ostrom recognizes that the repetitive application of rules can turn into a ‘social habit’, she argues that institutional evolution is based on ‘fallible, norm-adopting individuals who pursue contingent strategies in complex and uncertain environments’ (Ostrom, 1990, p. 185).

Critical institutionalists, in contrast, criticize the mainstream institutionalists’ assumptions of human interaction as socially uninformed and blind towards cultural factors and power relationships that unconsciously shape human actions (Cleaver, 2002, 2012; Cleaver & de Koning, 2015; Hall et al., 2014). In opposition to Ostrom’s assumption that rules are consciously practiced, rejected or negotiated based on human rationality, critical institutionalism understands institutions to be shaped by social and power relationships, psychological preferences and ‘culturally and historically shaped ideas about the “right way of doing things”’ (Cleaver, 2012, p. 15). People are thus able to plan actions purposefully and collectively, but non-conscious factors shape decisions through ‘taken-for-granted everyday practices and embedded ideologies’ (p. 15).

Cleaver (2012), following Douglas, (1986), defines institutions, therefore, as relatively stable social arrangements that rely on worldviews (e.g., religious beliefs, cultural convictions, etc.). As such, they cannot simply be replaced by new, rationally negotiated institutional impositions, such as the aquifer contract. Rather, institutional change works through analogies, which connect existing arrangements with emerging institutional innovations through ‘institutional leakage’. ‘Leaking’ in this context implies that emerging institutions adapt logic from existing or previous institutional arrangements.

Following Cleaver, this leaking of meaning and drawing of analogies in the adaptation of institutions implies that existing and evolving institutional principles become blended. Subsequently, public regulative measures, such as the aquifer contract, are not simply adopted but transform via mechanisms of institutional blurring and blending to fit the social lifeworld of their 'bricoleurs'.

CI's broader understanding of the emergence and change of institutions sheds a different light on a bricoleur's motivation to engage with and transform institutions. While MI assumes that institutional design implies the crafting of particular mechanisms for particular functions, the bricolage approach leads to institutions that are multifunctional. Here, institutions evolve through improvised adaptation in which 'decision-making arrangements and relations of cooperation may be co-opted for new purposes' (Cleaver, 2012, p. 87). Cleaver labels this as institutional plurality induced by specific identities of institutional participants that affect preferences towards certain arrangements (Cleaver, 2012).

These assumptions have far-reaching implications for the understanding of water governance arrangements, including aquifer contracts, and may explain why public regulative measures are not adopted or are adopted in a different way than expected. The institutional plurality of an aquifer contract, for instance, is linked to the fact that water users have different individual identities beyond their water use (e.g., male or female, young or old, etc.) that involve different personal motivations, interests and concerns. This also affects the water users' perception of groundwater governance arrangements; diverging identities entail different interpretations of changing 'elements' of their specific lifeworlds, for example, changes in formal rules that affect institutional arrangements. As institutional arrangements are shaped by social interaction and tied to elements of people's identity, this implies that they are bound to social groups, their related identity features and their specific interests (Cleaver, 2012). Subsequently, it depends on the particular norms, beliefs and world views of these social spaces whether water users perceive an institution as legitimate or not and whether and to what extent they cooperate to support the arrangement.

In our case study, we understand the aquifer contract as an institutional arrangement formed by different water users and the administrations involved (such as the water basin agency, several agricultural producer associations, the local authority for agricultural development, the regional council). According to the literature, the motivation for new groundwater governance rules emerges out of a general awareness of the insufficiency and/or non-application of existing rules and subsequent scarcity; Shah (2009) and Petit (2004) describe how resource users tend to craft institutions for groundwater regulation in the face of increasing groundwater scarcity. The engagement of different actors in the transformation of institutions depends on the actors' identity and their specific lifeworlds and on their social position as influenced by their relative power in the local setting, which, in turn, influences their access to governance arrangements. For the sake of our study, we define power as the capacity of bricoleurs to engage in the transformation process of institutions (Cleaver, 2012). Social resources such as social networks and trustful relationships are of particular importance here as they may allow or deny access to specific social alliances in which bricoleurs negotiate particular rules and roles of institutional arrangements (Cleaver, 2005). We understand social alliances as exclusively organized networks of social relationships with a strategic understanding of these networks in which actors realize mutual favours through

cooperation (cf. Long, 2001). In these alliances, bricoleurs have different capacities to engage in rule setting and benefit unequally from institutional outcomes. A group of water users that is a formal member of the aquifer contract, for instance, may be such a social alliance, but other alliances such as groups of villagers, other groups with shared identities and joint interests that exist independently from the contract may also impact the governance structure. Bricoleurs work within and through these relationships of power, using different social alliances to reshape institutional arrangements according to their specific priorities, and the drawing of analogies between and the blending of existing structural conditions.

The mechanisms deployed to reshape institutional arrangements may include practices of corruption. Rather than a form of illicit behaviour (cf. Teorell, 2007), we interpret corruption as an institutional mechanism that is part of the broader governance setting. Robbins (2000) defines corruption as ‘a system of normalised rules, transformed from legal authority, patterned around existing inequalities, and cemented through cooperation and trust’ (p. 424). In the process of institutional bricolage, corruptive practices evolve from social processes linked to the implementation of formal rules, such as the aquifer contract. As Robbins (2000, p. 428) states, policy interventions can favour the evolution of corruptive practices particularly when governance systems are marked by strong patterns of authority, as is the case in Morocco (Daadaoui, 2011). This raises the question of whether the implementation of the aquifer contract may have induced the evolution of corruptive practices as part of the reshaping of institutional arrangements.

Our analysis of the Chtouka aquifer contract as an institutional arrangement adopts the approach of institutional bricolage (Cleaver, 2002, 2012) to understand how institutional bricoleurs adopt and transform the formal rules of the contract through the blending and blurring of formal rules with existing institutional arrangements at the local level. This study focuses on the rules of the aquifer contract that relate to the regulation of groundwater access (monitoring of borehole drilling) but explicitly considers power issues and social/cultural factors as typical characteristics of critical institutionalist approaches. Based on these theoretical assumptions, the following three hypotheses guide the analysis:

- The aquifer contract as a new institutional arrangement emerged out of a general awareness about the insufficiency and/or non-application of existing rules and subsequent resource scarcity.
- A bricolage perspective entailing the analysis of power relations allows for better understanding of the adoption and reshaping of formal rule implementation related to the aquifer contract.
- Social and cultural factors such as group identity based on geographical or ethnic origin, on common language shape the implementation of the aquifer contract leading to multifunctional institutions.

Methodological approach

This study is based on the evaluation of qualitative data gathered during fieldwork in Chtouka and Agadir in October 2017. Qualitative research techniques and approaches stimulated wide-ranging conversations, while focusing on the previously defined fields of interests. Problem-centred interviews with local farmers, villagers,

Table 1. Overview of interviewees.

Local farmers	17
Villagers (representatives of the local drinking water association)	9
Representatives from local authorities in the agricultural and water sectors	13
Other experts (drilling companies, agricultural organizations)	6

representatives of farming organizations and officers from the different administrations related to the aquifer contract were at the heart of the research design. Problem-centred interviews were conducted with more than 45 respondents, 32 of which were recorded. The farmers and villagers interviewed were neither directly involved in the aquifer contract negotiations nor affiliated with participating associations. This selection assured an assessment of the extent to which institutional bricoleurs adopted and adapted the rules and mechanisms of the aquifer contract, including beyond the formal roundtable of the aquifer contract. The selection of interviewed farmers reflects their varied geographical origin, age and agricultural production schemes. This wide range of interviewees was chosen to represent a diverse and nuanced picture of how different institutional bricoleurs use different institutional mechanisms in the context of groundwater governance (Table 1).

The researchers adapted the methodological approach of problem-centred interviews to the highly varying social, professional and educational backgrounds of their interviewees. Thus, questions and their formulations were adapted according to both the fields of interests previously defined and the individual requirements of the interviewees in terms of social, educational and professional/thematic backgrounds to maintain empathy, interest and respect for the views of the interlocutors (Lamnek & Krell, 2010).

A Moroccan field assistant translated the interview sequences from Amazigh or Arabic into French during the interview recordings, and the researchers later translated them into English during the transcriptions. Lopez et al. (2008) argue that cross-cultural qualitative research is challenging because it is difficult to assess the reliability and the implicit meaning of information when conducting research outside one's own native language. To address these challenges, all scripts underwent a thorough joint-reflection process by the researchers and the translator.

The scripts were converted into research texts (Clandinin & Connelly, 2000) using MAXQDA software for qualitative data analysis. In doing so, qualitative data were interpreted along a hermeneutic process that included the alternate screening of field texts and review of literature. In this context, codes were developed that assigned meaning and attributes to selected passages of the field texts (Saldaña, 2016). The code creation also followed an iterative and hermeneutic approach whereby codes were inductively deduced from the qualitative material and derived deductively from the applied theory. The code system was developed during the transcription process and was readapted and modified during the theoretical elaboration and data analysis (Kelle, 2007). Along the data analysis, the research question and the generated hypothesis were revised, adapted and tested against the findings from the analysis.

The Chtouka aquifer contract as an institutional bricolage

Description of the case study region: from peasants to investors

The semi-arid Chtouka area is part of Southern Morocco's Souss-Massa Region and has witnessed a swift change towards agricultural intensification over the past 70 years. This has brought about two key trends that are crucial for understanding the emergence and evolution of the aquifer contract: important socio-economic transformations and a rapid depletion of groundwater resources (Bencherifa, 1980).

Until the 1950s, agriculture consisted of a complementary system of minor irrigated plots, extensive pastureland and rainfed cereal production (Bencherifa, 1980). In fewer than 50 years, Chtouka transformed from a rural subsistence economy to an agro-industrial production site with highly (ground)water-intensive greenhouse products cultivated for export. Between the 1950s and 1980s, Chtouka witnessed a massive emigration of rural inhabitants; every third man of working age migrated from Chtouka to France or Morocco's urban centres (Bencherifa, 1980). In the 1970s, the 80,000 ha Chtouka irrigation perimeter was inaugurated with specific mandatory cultivation plans and rotation cycles for the farmers. According to Pérennès (1993), this scheme presented a sharp rupture of the previous agricultural system and was a state-based attempt to transform collective farming systems into profit-oriented export enterprises. With the inability of many farmers to cope with the new requirements and large parts of land belonging to people who no longer occupied it and preferred to withdraw from the sector, a new dynamic of land selling and renting brought national and later international investors to the area (Popp, 1983). As with the evolution occurring in other parts of the country, this entailed a process of socio-economic marginalization of smallholders (Houdret et al., 2017). Two developments then further contributed to groundwater depletion: the deployment of large private farms, often beyond the limits of the public perimeter, that exclusively relied on groundwater (Pérennès, 1993) and unreliable water provision in the public irrigation scheme, which forced farmers to invest in groundwater pumping (Popp, 1983).

A culturally and socially diverse stakeholder landscape with large disparities in access to water and agricultural production resources emerged. Today, farmers range from international corporations to international and national export producers and smaller local investors/farmers (Sippel, 2016). According to a survey from 2015, 70% of the farmers in Chtouka operate on less than 10 ha and in total account for only 20% of the irrigated surface (Anzar Conseil, 2016a). As other authors have shown for the Souss-Massa Region, unequal access to groundwater reflects both income disparities and unequal access to different production resources, such as technical innovation and capital, as well as socio-political networks (Houdret, 2012).

The rapid extension and intensification of agriculture in Chtouka has provoked a massive depletion of groundwater resources: groundwater tables have fallen by 1.0 m per year on average since the 1990s and by 4.5 m per year since 2005 in the northern area (Anzar Conseil, 2016b). After the creation of the river basin authority (*Agence de Bassin Hydraulique* – ABH) in 2002, several hydrological studies revealed the severity of groundwater depletion and degradation in the whole region. In the following years, the ABH, in cooperation with provincial and local state authorities, attempted to enforce existing formal laws that have required an official licence for groundwater abstraction

since 1995. Between 2002 and 2003, they controlled water abstraction more strongly, closed wells and seized drilling equipment, which resulted in heavy protests by farmer groups and drilling companies (Faysse et al., 2012).

In order to prevent conflict between water users and enable sustainable groundwater use, the ABH launched a participatory process, which resulted in the elaboration of an aquifer contract. According to the 1995 Moroccan Water Law, aquifer contracts are instruments to improve regulation mechanisms of groundwater management through stakeholder participation at the aquifer level (Closas & Villholth, 2016). An aquifer committee set up in 2005 developed the so-called ‘framework convention’ entailing central objectives and legal proposals (including *inter alia* simplified procedures for obtaining water-related permits, formal authorizations of previously ‘illegal’ wells or increased volumetric charges for groundwater extraction). A series of ‘specific conventions’, partly overlapping with the framework convention, referred to specific activities such as the enforcement of controls and capacity-building of the ‘water police’, improvements in water efficiency, the development of additional surface water resources by the state as well as the commission of a feasibility study for a desalination plant. Two official decrees were adopted in 2007 to prohibit the extension of existing irrigated agriculture, be it by using existent or the drilling of new wells and boreholes. In the present article, the term ‘aquifer contract’ refers to all these three types of regulations. These constitute the basis of the formal interactions between the different stakeholders analysed here (see above, among others, administrations, farmers, irrigation water-user associations) and set the scene for some of the contested issues and related power struggles around groundwater regulation in the Chtouka.

These developments in the Chtouka area, and especially the evolution of groundwater regulating instruments, characterize the context of our analysis of the three research hypotheses. In the present setting, policymakers often accuse farmers of being unaware of the urgency of groundwater depletion and lacking action in this sense. However, in accordance with findings in the literature (Shah, 2009), our first hypothesis is that the aquifer contract emerged as a new institutional arrangement due to an increased awareness of water users and formal water institutions about the urgency to regulate groundwater use in the face of increased scarcity.

Second, we seek to comprehend how adopting a bricolage perspective entailing the analysis of power relations allows for a better understanding of the adoption and reshaping of formal rule implementation of the aquifer contract. The history of the region suggests that in addition to the implementation of the aquifer contract as a new formal rule, this study needs to consider pre-existing rules. As previous studies have shown (Faysse et al., 2012; Houdret et al., 2017), power relationships and practices of corruption influence the (non-)implementation of such rules and therefore also inform our analysis of the rule implementation.

Our third hypothesis is that social and cultural factors shape the implementation of the aquifer contract, leading to multifunctional institutions. In the Chtouka area, migration, settlement and investment dynamics are key for understanding social and cultural factors that influence the implementation of the aquifer contract and the related processes of bricolage. In addition, the contract has faced the criticism that mainly large-scale farmer organizations (such as the *Association Marocaine des Producteurs Exportateurs de Fruits et Legumes* – APEFEL) were included in its negotiation and that

farmers not involved in export, village organizations or representation of municipalities were marginalized from the ‘participatory’ negotiation of the new agreement (Faysse et al., 2012; Matz & Hoffmann, 2013).

Results

Awareness of insufficient rules as a precondition for new governance arrangements

In order to better understand the water users’ awareness of the insufficiency and/or non-application of existing rules, we enquired about their knowledge regarding the regulations for groundwater use and the existence of the new aquifer contract. These existing rules are partly formal (such as the need for licences for groundwater pumping) and partly informal (such as agreements between farmers sharing pumping stations). The results suggest that farmers and villagers in Chtouka are well informed about formal obligations related to groundwater abstraction: during the entire field study, we did not encounter a single person who was not informed about regulatory restrictions, the necessary authorization required for borehole drillings and the licensing of extracted water volumes. Interviewees were able to define whether they (or their competitors) acted in line with formal water law or not. As one interviewee explained:

I don’t think that the ABH issues authorisation to every borehole of which we hear the drilling. We always hear the drilling gear at night. Drilling at night already implies that they work in the dark [illegally . . .] imagine an investor, who drills a well at night – that means they have no authorisation.

‘You hear them drilling at night’ was the most memorable sentence mentioned during various field conversations – not only because it was said so often, but also because one could hear the noise of the night-time drilling. As the above quotation reveals, respondents link drilling noises at night to the illegal activities of water users. These explanations imply that accessing groundwater has become an observable and noticeable event for neighbours and other resource users.

Interviewees were able to describe temporal changes in groundwater governance, as a local tomato farmer illustrated: ‘In 2003–2004 the authority started chasing farmers who did not have an authorisation for their wells.’ Only two of the respondents¹ knew the term ‘aquifer contract’; they were able to recall related developments, measures and events that took place before and during the implementation process, for example, the start of control activities and awareness campaigns. Interviewees referred to control activities that started and became enforced between 2002 and 2008, which is consistent with descriptions provided by representatives of the ABH, ORMVA (Office Régional de Mise en Valeur Agricole) and the province and the literature (Faysse et al., 2012). In the above quotation, the word ‘chasing’ indicates that interviewees perceived the start of control activities as a rupture to previous public practices, where groundwater was rarely monitored via direct site controls by public organizations. These observations confirm our first hypothesis that the aquifer contract emerged in a context of high and commonly shared awareness of different water users about existing rules for resource governance and their insufficient application leading to the depletion of groundwater.

Power relations, including practices of corruption, influence aquifer contract implementation

Our analysis of the formal rule implementation of the aquifer contract shows that these rules are transformed or reshaped through processes of bricolage, involving power relations expressed *inter alia* through practices of corruption.

In the case of Chtouka, hierarchically organized social relationships (among villagers, farmers and administrations) enabled the formation of social alliances that fostered complex rule-making and role allocation among stakeholders for informal institutional mechanisms, such as corruption. Our interviews suggest that the implementation of the aquifer contract has contributed to the enforcement of corruptive practices in groundwater regulation: more than 18 of our field conversations linked groundwater control and monitoring to corruptive practices and provided detailed descriptions on related mechanisms and social-working rules. The aquifer contract ignored existing power asymmetries; some actors then used their power to circumvent the new regulations, which likely resulted in a reinforcement of corruption. The following quotation from a local, municipal-level political leader mirrors the gradual change of adoption and then circumvention of the new rules through bricolage – the blending of new rules with established practices, in this case corruption:

In the beginning of the law, the people were more motivated, they took the issue seriously. In the beginning people are motivated, and pushed to do controls. But later, people adapted to the project.

Researcher: What means adapted?

I don't have any proofs, but *you know how things work out here* [emphasis added]. If you know that there is a law and at the same time you find all these drillings, so you know how things work. There is a law, you have the authority which passes by, which observes, which knows that there is a drilling – but nothing changes! So, you can be sure how things work out.

This politician was an elected representative from one of the municipalities visited during the fieldwork (municipalities, unlike *Caidats*, were not invited to participate in the aquifer contract negotiations). What is special about this quotation is that the interviewee makes a chronological evaluation of the implementation process and points out that over time legally grounded controls have changed. While, in the eyes of the interviewee, controls initially met the legal requirements and objectives, they later became 'adapted'. We interpret the word 'adaptation' used by the interviewee as a reference to temporal processes through which the interviewee suspects the formal rules of the aquifer contract were appropriated and redefined within social practices at the field level. We conclude the latter from the phrase 'you know how things work out here', which the interviewee repeated several times. With different gestures and descriptions, he referred to payment flows that take place under the table, thereby avoiding the word 'corruption'. The statement suggests, on the one hand, that the interviewee views corruptive practices to be something ordinary and regular (i.e., bound to informal rules regarding the price, timing, etc.), a practice affecting different areas of everyday life (a statement explicitly supported by four other respondents). On the other hand, the interviewee avoided the word 'corruption', which we interpret as a precautionary measure in case our recording

would be made public.² We interpret this observation made in three other cases as a reference to the strong power relationships linked to corruption, and the related fear of respondents raising the issue publicly.

The following interview quotation illustrates the role of power relationships and related social alliances in the negotiation of groundwater access and bribes:

The controls turned into an investment. There are relationships in the field. That's why you call to say that someone is drilling – that's why there are no controls, because there are relationships. It [reports of illegal drilling] has become an affair of investment, to earn money. [...] There are no controls; I talk about it all the time. I already called [organisation and name redacted to protect the source] many times to inform them about an illegal drilling which is taking place near me or near another person who informed me. [...] So, what can I do? I make the calls, they arrive, they even seize the equipment and the very next day, you find the same equipment back in the field! I did this many times.

We interpret the phrase 'there are relationships in the field' as a reference to exclusive social alliances in which negotiated arrangements result in non-transparent regulation mechanisms for groundwater resources. In this context, formal law works as a reference point to provide legitimization to these arrangements. For instance, if one refuses to pay a bribe, access to water is restricted with reference to the application of formal law, as the granting of groundwater licences depends on an assessment process in which several administrations have to approve the drilling site. However, the quotation suggests that the interviewee accuses representatives of the administrations of participating in social alliances where corruptive mechanisms become organized along complex rules. As the quotation also indicates, the interviewee links phone calls (to report illicit drillings) to exclusive forms of cooperation between stakeholders from the field and those in administration. This implies that the interviewee perceives this form of cooperation (1) as tied to social relationships of well-organized alliances and (2) to offer the opportunity to participate in a financial allocation scheme of an extra-legal tax system (bribes).

Interviewees have highlighted institutional mechanisms and the complex social organization of corruption by pointing to different rules, roles and responsibilities that are in place and shared among different stakeholders, including farmers, administrations and drilling companies. The following quotation reveals the complexity of the social arrangements and how related institutional mechanisms function in Chtouka. It points to collective conventions that reflect relationships of trust within corruptive systems:

Researcher: Why did you drill at night?

Because of the *Caid*, the authority.

Researcher: But didn't they know that you drilled a well?

Yes, they knew, but it's *obligatory* [emphasis added] to pay some money and so I did.

Researcher: How much did you pay?

10,000 MAD³ for one well.

Researcher: Didn't you need to show an authorisation to the drilling company?

They don't ask, because they *know that you don't have an authorisation* [emphasis added]. If you have an authorisation, you must inform the company because drilling with an authorisation is cheaper than without one [500 and 800 MAD/m, respectively].

Researcher: Can you please explain how the deal between the authority and you was arranged?

You have to visit them before and to pay them in advance, then you can drill.

Researcher: Why did you not drill a well without this deal?

Because the people talk, the information passes very fast to the *Caid*, so you can't take that risk.

Researcher: Have you already observed farmers who were stopped by the authority while drilling?]

Yes, I have seen. They were several people who started drilling without an authorisation and the *Caid* came and took the equipment because they didn't give money. He comes to see if you have an authorisation and if you don't have, he confiscates the drilling equipment.

Researcher: How passes the information to the *Caid*?

So, everyone knows that drilling a well is illegal, so people talk about it and the *Caid* will know.

This quotation provides several interesting references that underline the institutional nature of corruption in this context. First, by stressing that giving money is *obligatory* the interviewee refers to corruption as a perceived fixed rule within groundwater governance. The note that drilling companies automatically expect one to drill without a licence underlines this argument. Further, the description highlights the different roles and tasks the interviewee ascribes to the different stakeholders, including farmers, the administration and the drilling company. As such, farmers need to make an arrangement with the authority prior to drilling or to inform the drilling company when the drilling has been officially approved by the administration. The role of the drilling company was also explicitly stressed by other interviewees, like this greenhouse tomato farmer:

If you give honey to the inspectors, they will close their eyes.

Researcher: Was an inspector sent to you?

No, he didn't come. It's the drilling company that is occupied with the management of this affair. You only give the money and they will manage the affair for you [...].

Researcher: So, when investing into agriculture it means that I already have to consider the corruption fee in my prior calculation?

If you don't give backsheesh, you stay at home.

Hence, interviewees described illegal drillings as a common practice that are a result of a high level of social organization and mutual agreements between stakeholders and are linked to well-established rules among the participants. These predictable patterns of social interaction point to the presence of institutional mechanisms that structure corruptive practices and reduce uncertainties associated with formal rule violation. Although formal rules enforced and strengthened by the aquifer contract grant equal

rights to all users, interviewees perceived those rules to have been transformed by social alliances into inequitable mechanisms that are selectively applied to water users according to their social (relationships or position within social alliances) or financial capacities (to pay bribery). Other respondents used words such as ‘lobby’ to point to the level of social organization beyond corruption. In an interview, two representatives of an agricultural organization pointed to the perceived unequal power relationships that restrict access to these social alliances where corruptive rules are set.

Corruption thus emerged as an indicator of power inequalities in the implementation of the aquifer contract, not only because of the financial capacities required, but also because of social resources needed such as influential networks and relationships to the authorities responsible for rule enforcement, etc. At the same time, the aquifer contract itself created a new opportunity for corruptive practices by providing them new legitimacy under the veil of a formal contract.

Social and cultural factors shape the implementation of the aquifer contract

Today, ‘water users’ as potential stakeholders of the aquifer contract are a socially, culturally and economically heterogeneous group due to, among others, emigration and immigration dynamics. Our analysis reveals that these actors reinvent the formal rules of the aquifer contract in different ways according to their social and cultural affiliations. The rules set in the aquifer contract transformed into multifunctional institutions for social regulation.

The following quotation exemplifies a normative attitude portrayed in 12 of the 45 interviews. The quotation is from an interview with two official representatives of a large agricultural organization with more than 600 farmers:

The problems are the people who came from outside, the foreigners, who are not from Souss-Massa, so the migrants⁴ from Morocco or from other countries. They are responsible because they sell the land afterwards or just leave it behind. So, for example, when a local inhabitant drills a well, I don’t have a problem with that, because he has his land here, I have my land here, so each of us is responsible for his land. But they [the migrants] are not conscious about the value of the land, they are not attached to the land.

Researcher: The members of your organisation are all locals, native inhabitants?

Yes.

Researcher: No migrants?

No.

In this case, the interviewee distinguishes between ‘native’ farmers, whom he considers morally entitled to the groundwater, and ‘non-native’ farmers who he deems are not. Formal rules become blended with normative concepts of what is right and what is wrong. In this case, these concepts are linked to specific social and cultural affiliations, and formal mechanisms get selectively applied if they correspond to the worldviews and related norms of their applicants. Also, responsibility for groundwater protection by restricting its use is transferred to the ‘outsiders’ while the natives are perceived to be more legitimate to use

the resource. The aquifer contract as a new institution is not only used for regulating groundwater, but also to exercise social control. Thus, formal institutions turn into multi-functional arrangements as they are applied against different backgrounds and objectives.

In the case of the quotation above, the reporting of unauthorized drillings depended on the origin of the farmer. Thereby, the motivation to report illicit drillings is less centred on formal rule compliance and general accounts for groundwater conservation. Rather, the willingness to participate in formal institutions can be interpreted as a means of defending a moral convention that defines who is entitled to the use of water and who is not. The reporting mechanism is interpreted as a means of excluding those farmers whose claim to water use is perceived as illegitimate.

Similarly, the same representatives of the agricultural organization explained that they faced challenges when reporting illicit drillings at the local *Caidat*. However, they argued that official declarations made at the *Caidat* have never been processed, in particular when declarations have affected farmers suspected to share the same cultural affiliations as the person in charge at the processing administration. Consequently, as they described in an interview, the farmer organization started forging new alliances with a representative of an administration who shares the same social and cultural affiliations:

Concerning the declaration, I have already talked to a [person] at the [administration and name is kept anonymous to protect source], [they are] *correct* [emphasis added] [they] will manage this affair, because when I talked with [them] about the issue, the situation in the field, [they were] cooperative, so we are currently waiting for a response. [...] But I talked to the person, whom I already mentioned, [they are] from the region, [they have] this *affiliation* [emphasis added] to the land, and [they] told me that as soon as I observe the person drilling again, I should just call [them] and [they] will send someone immediately. The *Caid* is not taking actions, because the *Caid* is from Tiznit and the person who is drilling is also from Tiznit, so they have a relation.

The trustworthiness of a contact person is stressed by referring to their ‘affiliation to the land’. We interpret shared cultural and social affiliations to be an important precondition for cooperation in this context. Thus, the interview suggests that institutional bricoleurs forge new social alliances to regulate groundwater access based on shared cultural and social affiliations.

Discussion and conclusions

Insights from this research support and complement existing findings. Our study confirms the work of Shah (2014) and Petit (2004) in their argument that water users develop new institutions for groundwater governance in response to water scarcity, but our findings also show a more complex picture. While the Chtouka aquifer contract did emerge in this context, not all relevant stakeholders had been included in its development (such as the municipalities or the irrigation and drinking water-user associations). Facing a new institution based on other actors’ logics and priorities, some of these stakeholders transformed the contract through institutional bricolage to adapt it to their own purposes and logics. In their perception, water scarcity was thus not the only – and maybe not even the main – trigger and purpose of ‘their’ aquifer contract.

The different stakeholders' motivations for engaging in an aquifer contract may be very diverse and not always linked to water management. As our study shows, bricoleurs blend the rules of the aquifer contract with normative concepts, leading to new social alliances based on reinvented shared identity characteristics and tied to a perceived common cultural background. In the case of Chtouka, some groups apply formal water rules selectively to water users who they perceive as illegitimate and thus transform institutions designed to manage groundwater into multifunctional institutions aimed at exercising social control. This supports claims for improved awareness of power relations in research and the need for local case studies (Cleaver & de Koning, 2015; Hall et al., 2014).

Our results not only confirm the existence of Cleaver's 'bricolage arrangements', but also provide concrete insights on how power materializes in new water governance arrangements and impacts non-water-related issues. Cleaver (2012) points to the importance of identity characteristics for the way institutional bricoleurs shape and transform institutional mechanisms. In addition, we argue that to better understanding institutional transformation, researchers and practitioners need to analyse the processes through which the reinterpretation of existing, shared affiliations transforms collective identity characteristics, and how this contributes to the transformation of institutional arrangements. The case of Chtouka shows how bricoleurs blend the logic of formal institutional processes with their own normative values, which are bound to specific identity, social and cultural characteristics. When taking ownership of an aquifer contract, the stakeholders interpret its rules and functioning against their personal background and interests and act accordingly. This confirms Cleaver's (2012) hypothesis that the new institutions' legitimacy strongly depends on its embedding in the stakeholders' identity. Further research should expand existing bricolage approaches to focus more precisely on the interplay of identity-generating processes and institutional bricolage. The specific socio-cultural setting, encompassing norms and values, but also the role of corruption in bricolage should be given more attention, as it affects the legitimacy and functioning of water governance institutions.

Our research also shows that the widespread hypothesis of policymakers that aquifer contracts – in contrary to top-down approaches – are participatory instruments that allow for improved user compliance (for an overview on the Moroccan case, see Molle, 2017) is only partially true. User compliance requires legitimate institutions – however, as illustrated above, this depends on adequately addressing the users' diverse logics of engagement in new institutions. These findings are also relevant for policymakers. Based on our insights, we can summarize that the design and implementation of aquifer contracts should not only be based on inclusive approaches, but also needs to consider local socio-economic power relations and the role of identity that may impact water governance. Policymakers should also give more attention to the mobilization of (new) collective identities or shared narratives that could support adherence to the new institution and thus its legitimacy and functioning. Finally, a smooth implementation requires conflict prevention that could be supported by legitimate and independent (eventually donor-supported) complain and dispute settlement mechanisms.

Notes

1. Other than those employed by ABH, the province, *Caidat* and the Office de Mise en Valeur Agricole (agricultural development board).

2. While the interview was being recorded, the participating office staff warned the interviewee several times to be careful. He responded that it is important to him to report the truth.
3. Moroccan dirham = US\$0.10.
4. They referred to investors and large farming companies.

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